

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE		Page of Pages 1 42		
2. AMENDMENT/MODIFICATION NO. 002		3. EFFECTIVE DATE September 1, 1999		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO. (If applicable)	
6. ISSUED BY Bureau of Reclamation Lower Colorado Region P.O. Box 61470 Boulder City NV 89006-1470		CODE LC-3113 http://www.lc.usbr.gov/~g3100/		7. ADMINISTERED BY (If other than Item 6)		CODE	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State, and ZIP code)				(T)		9A. AMENDMENT OF SOLICITATION NO. 99-SQ-30-0016	
				T		9B. DATED (SEE ITEM 11) August 16, 1999	
						10A. MODIFICATION OF CONTRACT/ORDER NO.	
						10B. DATED (SEE ITEM 13)	
CODE		FACILITY CODE					

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☒ is extended, ☐ is not extended.

Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing Items 8 and 15, and returning 1 copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. **FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER.** If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (if required)

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(T)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT/ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. **IMPORTANT:** Contractor ☐ is not ☐ is required to sign and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible)

Project Title: Turbine and Generator Bearings Lubricating System and Hydrostatic Lift System Hydraulic Power Unit at Headgate Rock Powerplant, BIA, Arizona.

Purpose of Amendment: The purpose of this amendment is to (1) extend the date for receipt of offers; (2) make revisions to the specifications and drawings; and (3) provide answers to questions posed at the site visit.

Receipt of Quotes: The date for receipt of offers is hereby extended from September 7, 1999 to September 10, 1999. The time and place remain no later than 3 p.m., local time, at the Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, Nevada (see block 9 of the "Solicitation/Contract/Order for Commercial Items," Standard Form 1449).

Acknowledgment: See block 11 above regarding how to acknowledge this amendment. The acknowledgment must be received at the place designated for receipt of quotes (see block 9 of the "Solicitation/Contract/Order for Commercial Items," Standard Form 1449).

Quote Modification: See block 11 above if you have submitted your quote and now desire to modify it or withdraw it.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		BY (Signature of Contracting Officer)	

Description of Changes: The following changes are made to the subject solicitation:

1. The Schedule of Supplies is changed to reflect unit price in lieu of lump sum pricing on items Nos. 1 through 3.
2. Part III - Statement of Work is revised extensively throughout.
3. Part IV - Revised to incorporate new Drawing No. 1117-D-1948.
4. Attachment No. 1 - Drawings - Drawing No. 1117-D-1946 is revised and Drawing No. 1117-D-1948 is added.

Instructions:

Remove Pages

3 through 5
29 through 50
51 through 52
Drawing No. 1117-D-1946

Replace with Revised Pages

3 through 5
29 through 50e
51 through 52
Drawing No. 1117-D-1946
Add New Drawing No. 1117-D-

1948

**TURBINE AND GENERATOR BEARINGS
LUBRICATING SYSTEM
AND
HYDROSTATIC LIFT SYSTEM
HYDRAULIC POWER UNIT
AT
HEADGATE ROCK POWERPLANT**

HEADGATE ROCK HYDROELECTRIC PROJECT, ARIZONA

FOREWORD

The Bureau of Reclamation requires that the successful offeror design, furnish, install and test three new hydraulic power units for the turbine and generator bearing lubrication system in accordance with the drawings and these specifications. Each hydraulic power unit shall consist of a high pressure hydrostatic lift system and a low pressure lubricating system. All components for each system shall be installed on one reservoir **and mounted on a stainless steel frame**. The Contractor shall furnish all the components for the **hydraulic power units** ~~high pressure pumping unit including~~ **except the low pressure pumps and motors.** ~~reservoirs and support frames.~~ The Government shall furnish all the low pressure pumping ~~units and associated equipment~~ **pumps and rebuilt motors.** **The Contractor shall clean and rebuild the low pressure pumps** ~~for the existing hydraulic power units for~~ **and installation the Government furnished equipment on the hydraulic power units.** ~~by the Contractor.~~

Headgate Rock Dam and Powerplant is located 1 mile north of the town of Parker, Arizona, approximately 1 mile west of the main road between the town of Parker and Parker Dam which is 14.4 miles upstream. The lubricating systems were damaged by water when the plant was flooded in October 1998.

A site visit is scheduled for August 23, 1999, at 10 a.m. Mountain Standard Time. Participants will meet at the Headgate Rock Powerplant parking area. Those wishing to attend the site visit should contact the Parker Dam Facilities Manager at 760-663-3712.

ACQUISITION OF THE ABOVE WORK WILL BE PURSUANT TO THE FEDERAL ACQUISITION REGULATIONS SUBPART 13.5, TEST PROGRAM FOR CERTAIN COMMERCIAL ITEMS WHICH AUTHORIZES ACQUISITIONS UP TO \$5 MILLION BE PROCURED UTILIZING SIMPLIFIED ACQUISITION PROCEDURES.

[This page is included to retain the pagination of the original hard copy.]

CONTINUATION OF BLOCKS FROM SF 1449

1. Block 15: Delivery To

(a) All supplies or equipment required under this contract shall be shipped f.o.b., destination to the following address:

Headgate Rock Dam Powerplant
Parker, Arizona 85344

(b) Deliveries will be accepted between 6:30 a.m. to 3:00 p.m., local time, Monday through Thursday, except Federal holidays. Point of contact for delivery information is Parker Dam Facility Manager, telephone No. 760-663-3712.

2. Block 16: Government Administration Personnel

The contracting office representative responsible for overall administration of this contract is:

Beverly Nelson (Mail Code: LC-3113), Contract Specialist
Bureau of Reclamation
P.O. Box 61470
Boulder City, Nevada 89006-1470
Phone No.: (702) 293-8524
Fax No.: (702) 293-8499
E-mail address: bnelson@lc.usbr.gov

3. Block 17a: Contractor's Administration Personnel

Offerors are requested to designate a person who will be in charge of overall administration of this contract.

Name: _____

Title: _____

Address: _____

City/State/Zip: _____

Telephone No: (____) ____ - _____

Fax No.: (____) ____ - _____

E-mail address: _____

4. Block 18b: Submission of Invoices.

(a) The COR has been designated authority to approve invoices for payments under the contract. To ensure timely processing of payments under the contract, the designated billing office for such payments is: Mr. Jack Delp (LC-6000), Bureau of Reclamation, PO Box 61470, Boulder City NV 89006-1470.

(b) Final payment under the contract will be approved by the Contracting Officer. The final invoice will be approved pursuant to the Prompt Payment clause in the contract after all contract settlement actions are complete. To ensure timely processing, the designated billing office for the final invoice is Ms. Beverly Nelson (LC-3113), Bureau of Reclamation, Lower Colorado Region, PO Box 61470, Boulder City NV 89006.

5. Blocks 19 Through 24: Schedule of Supplies/Services.

(a) The Requirements.

(1) The Contractor shall furnish the items identified in this Section, in accordance with the terms, conditions, and specifications contained in the contract.

(2) An offeror proposing prices on only part of a schedule will not be considered for award.

(3) Items 9-14 below are estimated quantities and are therefore applicable to the "Variation in Estimated Quantity" clause of this contract.

(b) The Schedule of Supplies/Services.

19. Item No.	20. Schedule of Supplies/Services	21. Quantity	22. Unit	23. Unit Price	24. Amount
% 1	Design, assemble, shop test and furnish three hydraulic power units and furnish spare parts	3 each			\$
% 2	Field assembly and installation of three hydraulic power units	3 each			\$
% 3	Servicing and testing three of completely assembled hydraulic power units	3 each			\$
% 4	Erecting Engineer onsite during commissioning of first unit; regular time	15 days			\$
5	Erecting Engineer onsite during commissioning of first unit; overtime -	7 days			\$

19. Item No.	20. Schedule of Supplies/Services	21. Quantity	22. Unit	23. Unit Price	24. Amount
6	Erecting Engineer onsite during commissioning of second unit; regular time	15 days			\$
7	Erecting Engineer onsite during commissioning of second unit; overtime	7 days			\$
8	Erecting Engineer onsite during commissioning of third unit; regular time	15 days			\$
9	Erecting Engineer onsite during commissioning of third unit; overtime time	7 days			\$
	Total for Schedule				\$

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PART III STATEMENT OF WORK

PART 1 - GENERAL REQUIREMENTS

1.01 The Requirement

a. General. - The Contractor shall ~~design~~, furnish and install three new hydraulic power units for the turbine and generator bearing lubrication system in accordance with the drawings and these specifications. Each hydraulic power unit shall consist of a high pressure hydrostatic lift system and a low pressure lubricating system. All components for each system shall be installed on one reservoir. **Except for the low pressure pumps and motors**, the Contractor shall furnish and install all the components for the ~~high pressure pumping hydraulic power units~~ including the reservoirs and support frames. The Government shall furnish all the low pressure pumping units and associated equipment ~~from the existing hydraulic power units~~ for installation by the Contractor.

1.02 Description of Work

a. General. - The principle components of the work to be performed under these specifications include the following:

(1) Visit the jobsite. - The Contractor shall visit the jobsite before proceeding with design and fabrication of the hydraulic power units. The Contractor shall: measure the as-built dimensions of the existing hydraulic power units; verify existing pipe sizes, location, routing, and configuration of equipment and piping; identify areas of potential interference; and obtain all other dimensions and information necessary to assure proper design, fabrication and installation of the equipment, piping and accessories with minimal modifications to the existing installation. The Contractor shall use the existing hydraulic power units to make templates or prepare drawings for locating all openings and installing all fittings required for the Government-furnished equipment. The Contractor shall connect the ~~low pressure~~ equipment to the existing bearing lubricating piping as shown on the drawings.

(2) Design the hydraulic power unit.

(3) Disassemble and clean the Government furnished low pressure pumps and shall replace seals, bearings, retaining rings, and any other defective parts to make the units serviceable.

(4) Furnish and install the hydraulic power units. The Contractor shall coordinate the electrical requirements for the **Government furnished** motor starter and electric power and controls with the Contracting Officer's Representative to insure proper sizing and operation of equipment.

(5) Install the Government-furnished components pumps and motors for the low pressure components of the turbine and guide bearing lubricating system on the new

reservoirs. These components are shown on drawing 1 (1117-D-1946) and identified on Airline Hydraulics Corporation drawings A-3389 Rev A Sheets 1 of 3 and 3 of 3.

- % (6) Complete the connection between the hydraulic power units furnished under these specifications and the **existing piping and** hydrostatic lift taps on the existing turbine and generator guide bearings.
- % (7) Test the hydraulic power units.
- % (8) The Contractor shall provide all materials, equipment, and tools necessary to install and test the hydraulic power units.

1.03 Submittal Requirements

The Contractor shall make timely submittals to the Government in accordance with this paragraph, Table 1.03-1 (List of Submittals), and all other requirements in the provisions of FAR (Federal Acquisitions Regulations) clauses, and paragraphs of these specifications.

The word "submittals" shall be interpreted to include drawings, data, manuals, certifications, test reports, curves, samples, brochures, and other items furnished by the Contractor for approval, information, or other purposes.

The time required for review of each submittal or resubmittal furnished under an RSN for approval will not begin until the Government receives complete sets of all the submittal materials required for that particular RSN, if necessary for informational continuity. The number of calendar days required for review of drawings or data submitted or resubmitted for approval will include the date the drawings or data are received by the Government, and will extend through the date of return mailing to the Contractor. Except as otherwise provided in these specifications, the Government will require 20 calendar days for review of each submittal or resubmittal furnished by the Contractor for approval. This review time will apply to each separate submittal or resubmittal whether the submittals are approved, not approved, or otherwise returned for revision.

If the Government uses time in excess of the specified number of calendar days for review of any submittal or resubmittal, additional time, not to exceed the excess time, will be added to the time allowed the Contractor for delivery of the materials or equipment affected by such excess time, to the extent it is demonstrated that the excess time caused delay. If the Government's review of two or more separate submittals or resubmittals is late and results in concurrent days of excess time, such days will be counted only once in computing an extension of the delivery date. Further, if the Contractor fails to make complete approval submittals in the sequence and within the time periods specified in these specifications, and thus precludes the Government from approving or considering for approval such submittals within the specified calendar day period, then the Contractor shall not be entitled to an extension of time allowed for delivery of the materials or completion of work.

One set of the submittals required for approval will be returned to the Contractor either approved, not approved, or approved with comments, and will be marked to indicate changes if required. Submittals which are not approved or which require changes or revisions, shall be revised and resubmitted for approval, and shall show changes and revisions with revision

date. All requirements specified for the initial submittal shall apply to any resubmittals required. All submittals which are to be resubmitted shall be resubmitted by the Contractor within 20 calendar days after the Contractor has received the Government's review comments.

Table 1.03-1 (List of Submittals) lists the submittals required by these specifications except those submittals which are required conditionally, required by entities other than the Federal Government, or which are periodic in nature. Any submittal required to be submitted by the Contractor, which is not listed in the table, shall be submitted in accordance with the applicable requirements elsewhere in these specifications. In case of a conflict between the requirements of this paragraph and the requirements included elsewhere in these specifications, the requirements elsewhere shall take precedence over the requirements contained in this paragraph.

Each item in table 1.03-1 (List of Submittals) has been assigned an RSN (Required Submittal Number). The "Submittals required" column of the table specifies the material to be submitted for each RSN. All of the submittal items specified for an RSN will be considered a complete set.

Where the submittals required for an RSN are specified as separate or distinguishable parts, a complete set shall include all parts. Only complete sets shall be submitted whenever possible. As an option, the Contractor may submit materials required for more than one RSN with the same submittal cover letter, provided that they are required by the same responsible code.

The Contractor's submittal cover letter shall include:

1. Reference to the Government contract number.
2. Identification of responsible code for each RSN as listed in Table 1.03-1 (List of Submittals).
3. Complete list of RSN(s) for which material is being submitted.
4. List of materials being submitted for each RSN.
5. Identification of the submittal as an original submittal or resubmittal.

The number of complete sets to be submitted, and the location to which they are to be sent, shall be in accordance with the "No. of sets to be sent to:" column of the table, except as provided below for sets of original material.

When an RSN involves submittal of original (non-copied) material, all original material, or as much thereof as is necessary to form a complete set, shall be included in just one complete set. This "originals" set shall be sent to the proper address as determined by the "Responsible code" column of the table and the following:

1. CO indicates Contracting Officer.

2. RE indicates Regional Engineer.

3. TSC indicates Denver Office

The "originals" set shall be counted as one of the complete sets required to be submitted under the "No. of sets to be sent to:" column of the table.

Each drawing submitted by the Contractor shall have the Contractor's or supplier's title and drawing number on it. The drawings and data shall be labeled with the Government's contract number and the bidding schedule item number.

Manufacturer's data for commercial products or equipment, such as catalog cut sheets, shall be clearly marked to indicate the item(s) to be furnished. The data shall be sufficiently comprehensive to identify the manufacturer's name, product or equipment type, model, size, and characteristics. They shall completely demonstrate that the product or equipment meets the requirements of these specifications. Submittals requiring certification by registered professionals shall be signed and sealed.

The Contractor shall send the submittals to the applicable addresses listed below as required by table 1.03-1 (List of Submittals).

The Contractor shall also send a copy of the transmittal letter to each of the addresses listed below that are not receiving the complete submittal for a specific RSN.

Submittals shall be sent as required by table 1.03-1 (List of Submittals) to:

1. Contracting Officer, Attention: LC-3113, Bureau of Reclamation, PO Box 61470, Boulder City NV 89006-1470

2. Regional Engineer, Attention: LC-6000, Bureau of Reclamation, PO Box 61470, Boulder City NV 89006-1470

3. Denver Office, mail to: Bureau of Reclamation, Attention D-8410, PO Box 25007, Denver, Colorado 80225-0007

Table 1.03-1 - List of submittals

RSN	Item	Reference provision, clause, or paragraph	Responsible code	Submittal items	No. of sets to be sent to:*			Due date or delivery time
					CO	RE	TSC	
C1	Safety Program	WBR 1452.223-81	RE	Safety Program	0	1	0	Prior to beginning work onsite
C2	Warranty	52.246-18	CO	Warranty of Complex Items	1	1	1	Prior to final payment
C3	Liability Insurance	1452-228-70	CO	Acceptable evidence showing the insurance has been obtained	1	0	0	Prior to commencement of work onsite

RSN	Item	Reference provision, clause, or paragraph	Responsible code	Submittal items	No. of sets to be sent to:*			Due date or delivery time
					C0	RE	TSC	
C4	Hazardous Material	52.223-3	RE	Material Safety Data Sheets	0	2	0	Prior to bringing materials onsite
C5	EFT Information	52.232.34	CO	ACH Form	1	0	0	At least 14 days prior to submission of 1 st invoice
C6	Release of Claims	1452-204-70	CO	Release of Claims	1	0	0	After completion of work and prior to final invoice
M1	High Pressure Lube Oil Systems	1.04.c.(1) and 3.01.b.	D-8410	Approval Drawings and Data (1) Calculations (2) Procedures (3) Assumptions (4) References	0	2	3	20 days after notice to proceed is received
M2	Hydraulic Power Units	1.04.d.(1) and 3.02.b.(1)	D-8410	(1) Approval Drawings and Data (a) Commercial Products (b) Hydraulic Reservoir Drawings (c) Frame Drawings (d) Hydraulic Power Unit Drawings (e) Electrical Requirements	0	2	3	20 days after notice to proceed is received
M3	Hydraulic Power Units	1.04.e. and 3.02.b.(2)	D-8410	(2) Final Drawings and Data (a) As-built Drawings (b) Service Manuals	0	2	3	20 days after notice to proceed is received
M4	Hydraulic Power Units	1.04.f., 3.02.e. and 3.02.h.	D-8410	Test Reports (1) Shop Tests (2) Field Tests and Certification	0	2	3	2 weeks after tests completed

*RE indicates Regional Engineer, Boulder City NV; CO indicates Contracting Officer, Boulder City NV; and TSC indicates Technical Service Center, Denver. For mailing addresses, see subparagraph entitled "Addresses" of paragraph 1.03 entitled "Submittal Requirements."

1.04 Drawings and Data to Be Furnished by the Contractor

a. General. - All drawings and data shall be in accordance with this paragraph; paragraph 1.03 (Submittal Requirements); and the applicable equipment and/or materials paragraphs. All drawings and data shall be written in English, shall be made expressly for this contract (typical drawings will not be acceptable), shall be complete and accurate in their content, and shall be legible. Freehand sketches will not be accepted. Where feasible, all outline assembly and detail drawings shall be made to scale. When a scale is used to make a drawing, it shall be an engineer's or architect's scale with its graduations conforming to the United States of America foot and inch system. The scale used shall be indicated on the drawings.

The Government reserves the right to require the Contractor to make any changes in the equipment design and drawings which may be necessary to make the equipment and drawings conform to the requirements of these specifications, without additional cost to the Government.

When revised drawings are resubmitted, the changes from the previous submittal shall be clearly identified on the drawings. The submittal letters shall describe the reasons for significant changes.

After the approval drawings and data have been submitted and returned approved, with or without comments, the Contractor shall make no further changes to the design without the approval of the Contracting Officer. All of the approval drawings shall be submitted promptly. The time required for return of the approval drawings will start with the date of receipt of the last required approval drawings and data.

b. References:

% **ANSI B16.5 - 1996 - (American National Standards Institute) Pipe Flanges and Flange Fittings**

% **ANSI B36.19 - 1985 - (American National Standards Institute) Stainless Steel Pipe**

% **ANSI B46.1 - 1995 - (American National Standards Institute) Surface Texture**

ANSI B93.18 - 87 - (American National Standards Institute) Non-Integral Industrial Fluid Power Hydraulic Reservoirs

% **ANSI B1.20.1 - 1983 - (American National Standards Institute) Pipe Threads, General**

ASME B1.20.3 - 1991 (American Society of Mechanical Engineers) Dryseal Pipe Threads

% **ASME B31.1 - 1998 (American Society of Mechanical Engineers) Power Piping**

ASME B40.1 - 1991 (American Society of Mechanical Engineers) Gauges - Pressure Indicating Dial Type

ASTM A 240/A 240M-98a - (American Society for Testing Materials) Standard for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure vessels.

ASTM A 276-98a - (American Society for Testing Materials) Standard Specification for Stainless Steel Bars and Shapes.

% **ASTM A 312-/A312M - 1998 - (American Society for Testing Materials) Standard**
% **Specification for Seamless and Austenitic Stainless Steel Pipes.**

% **ASTM A 320-/A320M - 1997 - (American Society for Testing Materials) Standard**
% **Specification for Alloy Steel Bolting Material for Low -Temperature Service.**

% **ASTM A 403-/A403M - 1998 - (American Society for Testing Materials) Standard**
% **Specification for Wrought Austenitic Stainless Steel Pipe Fittings.**

% **MSS SP-6 - 1996 - (Manufacturers Standardization Society of the Valves and Fitting**
% **Industry) Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End of**
% **Valves and Fittings**

SAE J 514 - 1996 - (Society of Automotive Engineers) Hydraulic Tube Fittings

c. Approval drawings and data. - Within 20 calendar days after date of receipt of notice to proceed with the contract and before beginning with factory fabrication, the Contractor shall submit to the Government for approval, a total of five sets of all drawings and data listed below.

(1) Approval data. - Complete, checked and dated: calculations, procedures, assumptions, and references used to determine the flow, pressure, verify the heat exchanger requirements, and size of the hydraulic power units and associated equipment for each bearing.

If revised drawings are submitted for approval, the changes from the previous submittals shall be clearly identified on the drawings, with every revision made during the life of the contract shown by number, date, and subject in a revision block, and a notation shall be in the drawing margin to permit rapid location of the revision. The drawings shall be clear and legible in all respects.

The Contracting Officer shall have the right to require the Contractor to make any changes in the equipment design which may be necessary, in the opinion of the Contracting Officer, to make the equipment conform to the requirements of these specifications, without additional cost to the Government.

Approval by the Contracting Officer of the Contractor's drawings shall not be held to relieve the Contractor of any part of his responsibility to meet all of the requirements of these specifications or for the correctness of his drawings. Any manufacturing done or shipment made before approval of the drawings will be at the Contractor's risk.

Drawings shall be ANSI size D (22 inches in height, 34 inches in width).

A narrative index list shall be furnished by the Contractor indicating Contractor's drawing number and drawing title. The narrative index list shall be identified by solicitation/specifications numbers and project.

d. - Hydraulic Power Unit Design Data. - After the design of the hydraulic power units has been completed, but in any event within 20 calendar days after receipt of notice to proceed with the contract, the Contractor shall furnish a total of five copies of the following calculated data regarding the hydraulic power units.

(1) Approval data:

(a) Commercial products data: application and complete performance data showing rated capacities, pressures and temperatures, leakage rates, compliance with applicable industry codes and standards; physical characteristics showing dimensions, weights, construction materials, accessories, required clearances;

(b) Drawing showing fully dimensioned hydraulic reservoir. Identifying size and purpose of all openings and fittings.

(c) Drawing showing fully dimensioned support frame including sizes of all members and bill of materials.

(d) Drawing showing fully assembled hydraulic power unit including bill of materials and ~~high pressure side~~ hydraulic schematic.

(e) Electrical requirements: Complete motor data sheets with all information as shown on drawing 40-D-6032; wiring diagrams and bill of materials.

e. - Final drawings, data and service manuals. - The Contractor shall furnish one complete set of final as-built drawings and computer files on 3.5-inch floppy disk or CD-ROM in AutoCAD (DWG) format, Drawing Transfer Format (DXF), or Initial Graphics Exchange Specification (IGES) format. All revisions shall be indicated in dated and signed or initialed revision blocks.

(1) As-built drawings shall show all changes and revisions, with revision dates, made up to the time the equipment is completed and ready for shipment.

(2) Service manuals shall contain complete parts identification lists; lists of special tools, and accessories for pumps; and detailed instructions for the installation, operation, lubrication, winterizing procedures, and maintenance of the equipment; and shall be in tabular form.

Submit a total of five sets of the following data:

(a) As-built drawing showing the fully assembled hydraulic power unit with high pressure and low pressure components.

(b) Service manuals for the high pressure side of the hydraulic power unit. Manuals shall include copies of all previously approved data and drawings.

f. - Shop test reports. - Within 2 weeks after completion of the shop tests, the contractor shall submit a report containing verification that the unit does not leak, the unit will deliver oil at each of the outlet ports in the quantity and at the pressure specified. The Contractor shall furnish a total of five certified copies of all test reports, data, etc.

Field test report and certification. - Within 2 weeks after completion of the field tests, the contractor shall submit a report containing the test procedures, processes followed, results of each valve setting and modes, list pressure settings, list any adjustments made, list settings of all valves and switches and certification in writing and on company letterhead that the equipment is fully serviced, checked, tested, adjusted and ready for operation. The Contractor shall furnish a total of five certified copies of all test reports, data, etc.

g. Payment. - Payment for the items submittals listed in this subparagraph 1.04 (Drawings and Data to Be Furnished by the Contractor) shall be made at the lump-sum prices bid therefore in the schedule and corresponding to paragraphs 3.01 (Design) and 3.02 (Hydraulic Power Unit).

PART 2 - MATERIALS AND WORKMANSHIP

2.01 Materials and Workmanship

Unless otherwise stated in these specifications, materials used in the manufacture of the equipment shall be new and of the highest standard commercial quality as normally used for this type of equipment, and free of defects, considering strength, ductility, durability, best engineering practice, and the purpose for which the equipment is to be used.

Liberal factors of safety, which will assure durability and a reasonable life expectancy for all new components, shall be used throughout the design and especially in the design of all parts subject to cyclic stress or shock. For all new parts of the equipment, the maximum stress in the materials shall not exceed one-third of the yield strength nor one-fourth of the ultimate tensile strength when subjected to maximum normal operating conditions.

2.02 Work and Materials to Be Furnished by the Government

a. The Government will provide, without cost to the Contractor, the following labor, materials and storage, and perform the following work:

1. Furnish the cranes and crane operator as necessary when moving materials into and out of the powerplant.

The Government-operated cranes will be available for the Contractor's use based on the following backcharge. If a conflict exists, the Government will determine the necessary priorities. The crane and operator will cost the Contractor \$40 per hour (including standby) when there is notification of the need more than 48 hours prior to use. If notification is less than 48 hours, the rate will be \$60 per hour. Any labor, including rigging and rigger, other than the crane operator, required to handle the equipment, materials or supplies, shall be furnished by the Contractor.

2. Furnish alternating-current electrical energy at 480 volts, 60 amperes, three-phase as required by the Contractor. The Contractor shall supply all equipment for connecting to this power supply.

3. Furnish alternating-current electrical energy at 120 volts, 15 amperes, single-phase as required by the Contractor for lighting and power tools.

4. Water can be furnished from service outlets. The Contractor shall furnish and install, at the Contractor's own expense, any additional pipelines, connections, and appurtenances required by the Contractor for the Contractor's own use or convenience in performing the work. The Contractor shall remove all such additional pipelines, connections, and appurtenances upon completion of the work. No waste of Government-furnished water will be permitted.

5. In the event storage is required for any lube oil system materials prior to their installation, such storage shall be at the risk of and at the expense of the Contractor. The Government will, however, cooperate in providing without charge to the Contractor

such inside or outside temporary project storage space as might be available for such purpose. Inside storage space is available at Parker Dam warehouse 15 miles from Headgate Rock.

2.03 Work and Materials to Be Furnished by the Contractor

a. Except as otherwise provided in the previous paragraphs, the Contractor shall furnish all labor, materials, equipment, instruments, and tools required in connection with the manufacture, installation, and testing of the hydraulic power units. The Contractor shall also furnish all labor for proper disposal of existing hydraulic power units from the jobsite, including transportation. Labor for testing shall include all labor except that furnished by the Government in conjunction with the field tests. Accordingly, labor for testing shall include all major piping connections involving the hydraulic power units and their interface to the existing equipment/system.

1. The contractor shall be responsible for all transportation, housing costs and subsistence expenses of its personnel.
2. The Contractor shall bear all costs of loading, transporting, unloading and handling all required materials from the Contractor's shipping point or points to the point of storage at the powerhouse. The Contractor shall also bear all costs of transporting test instruments and equipment to and from the jobsite.
3. The Contractor shall be responsible for all materials requiring special storage conditions, including controlling temperature, humidity, dust, or any other atmospheric conditions that are not a normal condition at the powerplant. The Contractor shall advise the Government of all materials which have a limited shelf life and which the Contractor recommends to be shipped immediately prior to installation. All hazardous materials shall be plainly identified as such on the container along with a label stating the contents, handling, and first-aid treatment. The Contractor shall also provide a storage cabinet or other suitable facilities for storing flammable or toxic materials.
4. Furnish scaffolding and work platforms as required.
5. Furnish fire protection for work area.
6. Furnish personal safety equipment, hard hats, safety glasses, hearing protection, respirators, first aid supplies, etc., for its employees.
7. Furnish wire ropes and slings for removal and installation of any portions of the lube oil system as necessary.
8. Provide local (in the immediate work areas) approved flammable liquid storage cabinets to be used for the storage of solvents, resins, and other flammable liquids.
9. Conduct a safety inspection after each final shift for fire hazards, unnecessary energized equipment, and materials, boxes, etc. which may block access.
10. Each shift shall check in and out of the control room upon arrival/departure to/from the project.

11. The Contractor shall provide an On-Site Technical Supervisor who shall provide technical direction to the installation crews. This shall include but not be limited to training of special procedures which may be required to install lube oil systems, inspection of the work to ensure that the drawings and installation procedures are being followed and quality assurance of the work, progress reports, general planning and layout of the work performance evaluation of the installation crews, and training of necessary safety procedures. The On-Site Technical Supervisor shall be present at the site at all times when work is in progress or must be available within four hours of the Government's request. The Government shall have the right to require the Contractor to replace any On-Site Technical Supervisor who fails to comply with Contract Document requirements.

PART 3 - HYDRAULIC POWER UNIT

3.01 - DESIGN

% a. General. - The Contractor shall design ~~the high pressure side of~~ **furnish and install**
% ~~the hydraulic power units to provide the required flow and pressure for lubricating and~~
% ~~hydrostatic lifting of the guide bearing loads shown on the turbine and generator bearing~~
% ~~data sheets. All oil and water piping to the oil cooler (heat exchanger) shall be~~
% **provided with bypass piping and valving.**

b. Submittal data. - All data shall be in English units. The Contractor shall submit a total of 5 sets of the following data:

% (1) Approval data. - Complete, checked and dated: calculations, procedures,
% assumptions, and references used to determine the flow, pressure **losses, and**
% **rated pressure for the high pressure pump**; verify the heat exchanger
requirements, and size of the hydraulic power units and associated equipment for
each bearing. The calculations shall be the product of a professional engineer
regularly engaged in the design of hydraulic power units, and shall be certified by a
currently registered Professional Engineer stamp.

Submittals - Submittals shall be in accordance with this subparagraph, paragraph 1.03 (Submittal Requirements) and 1.04 (Drawings and Data to be Furnished by the Contractor).

% c. ~~Lift~~ Pressures and ~~lift~~ **oil** flows. - The pressure and flow requirements for **lubricating**
% **and** hydrostatic lift at each guide bearing shall be in accordance with the following:

(1) Generator guide bearings. - The flow and pressure required to sustain hydrostatic lift, and the recommended minimum pump pressure for the generator guide bearings are shown on the generator manufacturer's engineering data sheets shown on drawing 2 (1117-D-1947). The generator guide bearing is shown on drawings 18 (063-000-160) and 19 (000-303-174). The combined generator guide and thrust bearing are shown on 20 (061-000-085) and the guide bearing details are shown on drawing 21 (000-303-186). The oil pressure in the inlet line shall be sufficient to maintain the necessary flow. The operation and maintenance manuals for the turbines state that hydrostatic lift line will be about 1750 PSI after lift-off.

% (2) Turbine guide bearing. - The recommended hydrostatic lift pressure for the turbine
% guide bearing is shown on the turbine manufacturer's journal guide bearing data
% turbine specifications sheet shown on drawing 2 (1117-D-1947). **The recommended**
% **lift flow and pressure are 0.75 gal/min and 1,500 lb/in².** ~~Contractor shall determine~~
% ~~the flow requirements for the turbine guide bearing and verify the required pump~~
% ~~pressure.~~ The turbine guide bearing is shown on drawing 17 (126-56042-0002 F).

d. Hydraulic power unit sizing. - The high pressure pump for hydraulic power unit shall be sized for the total flow and maximum pressure required to sustain lifting loads. The Contractor shall design the high pressure side of the hydraulic power unit to sustain the

required hydrostatic lift pressure and flow at each bearing until the turbine/generating unit attains the speed required to achieve hydrodynamic flow.

e. Heat exchanger. - The high pressure pump is expected to operate approximately 5 minutes on turbine startup. The Contractor shall verify the oil cooling requirements **for the high pressure lift system** and shall size, furnish and install a heat exchanger if necessary. **This heat exchanger is in addition to the cooler required by the low pressure lubricating system. At the Contractors option, the cooling requirements may be combined and supplied by one cooler. The maximum water supply temperature is 95 degrees F. Oil supply temperature shall be maintained between 100 and 120 degrees F. The maximum oil return temperature shall not exceed 150 degrees F.** If a heat exchanger is required, the Contractor shall ~~obtain a water quality report from the Contracting Officer's Representative before proceeding with sizing and selecting~~ **select** materials for the heat exchanger **in accordance with paragraph 3.02.c.(19) of these specifications.**

f. Arrangement - The hydraulic power units shall be arranged and built to fit the limited space as shown on the drawing. The suction filter shall be located on the outside of the reservoir. The pressure filter shall be located so it is readily accessible for maintenance. All adjusting screws shall be readily accessible and the pressure gauge and pressure switch shall be located for easy viewing. Hydraulic fluid lines, fittings, and hydraulic components shall have a staggered configuration within the hydraulic power unit so that removal of any one component can be accomplished without removing any other component.

3.02 - HYDRAULIC POWER UNIT

a. General. - Each hydraulic power unit shall be furnished complete with: stainless steel reservoirs and stainless steel mounting frame; high pressure pumping unit including motor ~~and motor control equipment; remote mounted control panel;~~ relief valves, flow control valves, **flow meters with switch;** pressure control valves, isolating valves; flow dividers; filters and strainers; tubing; piping; pressure **and temperature** gauges, **temperature** and pressure switches; **float switch; heat exchanger; heater;** and all other accessories, **except Government furnished equipment,** required for a complete ~~high pressure lift system ready for operation.~~

The low pressure pumps and motors, and all motor control equipment and panels for the hydraulic power unit will be furnished by the Government.

b. Submittal data - The Contractor shall submit a total of 5 sets of data in accordance with the following:

(1) Approval data:

(a) Commercial products data: application and complete performance data showing rated capacities, pressures and temperatures, **pressure losses,** leakage rates, compliance with applicable industry codes and standards; physical

characteristics showing dimensions, weights, construction materials, accessories, required clearances.

(b) Drawing showing fully dimensioned hydraulic reservoir. Identifying size and purpose of all openings and fittings.

(c) Drawing showing fully dimensioned support frame including sizes of all members and bill of materials.

% (d) Drawing showing fully assembled hydraulic power unit including bill of materials and ~~high pressure side~~ hydraulic schematic.

(e) Electrical requirements: Complete motor data sheets with all information as shown on drawing 40-D-6032; wiring diagrams and bill of materials.

Submittals - Submittals shall be in accordance with this subparagraph, paragraph 1.03 (Submittal Requirements) and 1.04 (Drawings and Data to be Furnished by the Contractor).

(2) Final as-built drawings, data and service manuals. - As-built drawings shall show all changes and revisions, with revision dates, made up to the time the equipment is completed and ready for shipment. The Contractor shall furnish the final drawings as a full size print and on a 3-1/2 inch diskette in AUTOCAD (DWG) format, Drawing Transfer Format (DXF), or Initial Graphics Exchange Specification (IGES) format

Service manuals shall contain complete parts identification lists; lists of special tools, and accessories for pumps; and detailed instructions for the installation, operation, lubrication, winterizing procedures, and maintenance of the equipment; and shall be in tabular form.

Submit a total of five sets of the following data:

(a) As-built drawing showing the fully assembled hydraulic power unit with high pressure and low pressure components.

% (b) Service manuals for ~~the high pressure side of the hydraulic power unit~~ **excluding data for the Government furnished pumps and motors**. Manuals shall include copies of all previously approved data and drawings.

Submittals - Submittals shall be in accordance with this subparagraph, paragraph 1.03 (Submittal Requirements) and 1.04 (Drawings and Data to be Furnished by the Contractor).

c. Materials. - All materials shall be new and shall be the product of manufacturers regularly engaged in the production of equipment suitable for use with high pressure hydraulic systems. All materials shall be manufactured and rated in accordance with recognized industry standards. All products shall be suitable for the intended application. Materials for the hydraulic power unit shall conform to the following:

% (1) **High pressure** pump. - The oil pump shall be have the following salient characteristics:

% The oil pump shall be the fixed-displacement, high pressure type having a flange suitable for mounting on the electric motor or separately mounted on a motor and pump mounting plate. A coupling guard shall be provided when a flexible coupling is used. The pump capacity and working pressure shall be as determined by the contractor for the intended application based on the drawings and data provided in these specifications, **and proposed hydraulic system component pressure losses and leakage rates**. Maximum speed shall not exceed 1,800 revolutions per minute. The pump shaft shall be provided with suitable bearings and shall be adequately packed or sealed to prevent leakage.

Provide one set of the pump manufacturer's recommended spare parts for each pump.

(2) Induction motor for oil pump. - The induction motor shall have the following salient characteristics:

(a) General. - The motor furnished shall be designed for the duties specified, shall be of the squirrel-cage induction type, and shall conform to NEMA publication No. MG1 including characteristics, tests, and ratings, unless otherwise specified.

The motor shall be totally enclosed, fan cooled. The motor shall be furnished with a breather and a drainplug in its enclosure. The drainplug shall be so located that it will be accessible to permit complete draining of any water that may accumulate in the motor housing.

The motor shall be designed for across-the-line starting, at full voltage. The Contractor shall coordinate the motor characteristic and torque requirements of the load so that proper operation of the hydraulic power unit will be obtained during the sequence of starting, accelerating, and normal running. The motor shall be rated three phase, 60 hertz, 460 volts AC.

The horsepower rating of the motor shall be such that it will carry continuously the maximum possible load developed under all operating conditions specified, without exceeding the nameplate rating and without benefit of a service factor.

The motor will be operated in an ambient air temperature of 7 to 40EC and at an elevation of 300 feet above sea level. The maximum temperature rise of the windings when the motor is delivering rated output continuously at rated voltage and frequency shall not exceed 80EC by resistance for class B, F, or H insulation. The temperature rise of other parts of the motor shall be in accordance with the standards for class B insulation.

(b) Motor efficiency. - The motor efficiency stated on drawing 7 (40-D-6032) shall allow for windage, friction, open-circuit core losses, stray-load losses, and I^2R losses in the stator elevation and rotor at the temperature of 75 EC as obtained in the manner specified in the standards.

(c) Stator. - The motor winding leads shall be brought out of the stator frame to the terminal box and each lead shall terminate in a solderless connector. The winding lead insulation shall be completely sealed so that it is equal to the winding coil insulation in regard to resistance to moisture and voltage class. The connection in the terminal box to external leads shall be tapped.

The windings shall be insulated with class B, F, or H insulation. The insulation shall be treated so as to prevent damage from temporary exposure to dampness.

The rotor structure shall be built up in accordance with modern practice and provided with squirrel-cage windings of suitable resistance for starting the motor and its load with the required starting voltage.

(d) Bearings. - The motor shall be equipped with bearings that are designed for the specific duty herein. The bearings shall be oil or grease lubricated. The bearings shall be sealed against loss of the lubricant or entrance of dirt. Each bearing shall be insulated to prevent circulating currents from passing through the bearing surfaces. The bearing insulation may be omitted provided the induced shaft voltages are sufficiently low so that current will not flow through the bearing lubricating film from one bearing surface to another.

(3) Oil reservoir. - Unless otherwise indicated, the reservoir shall conform to the general requirements of ANSI B93.18. The reservoir shall have a capacity of approximately 500 gallons including an air space equal to 10 percent of tank volume between the maximum oil level and the top of the reservoir. The reservoir shall be complete with: clean out doors on each end, slope to drain plug at low end; minimum of one interior baffle separating the oil return side from the pump suction side; high-strength permanent magnetic separator; **armored site gage; and dessicating vent cap.** The top plate shall be sized to adequately support the imposed loads due to the high pressure pumping unit **pumps, motors, and accessories including** and the Government-furnished equipment. In addition to the fittings required for the high pressure pumping unit and associated components ~~the~~ **The** reservoir shall be equipped with the required fittings for installing **all components.** ~~the Government-furnished equipment.~~ The reservoir and any internal piping and fittings shall be constructed of stainless steel, ASTM A276 type 304, and shall be built for mounting on the support frame. A baffle shall be provided between the pump suction and return lines. The fittings for the oil-level sight gauge shall be mounted on the front side of the reservoir.

(4) Support frame. - The support frame shall be stainless steel, ASTM A276 type 304, designed in accordance with AISI. The support frame shall be provided with pre-drilled connections for field assembly in the turbine pit where shown on the drawings. Hardware for connecting frame members shall be in accordance with AISI. Removable lifting brackets shall provided as shown on the drawings.

(5) Suction oil filter. - The suction filter shall have the following salient characteristics:

The suction oil filer shall be of the removable filter-element type. It shall filter all the oil passing through the line. The filter shall have a visual indicator to show when the

element needs cleaning and an automatic bypass that limits the pressure drop through the filter to not more than 2 pounds per square inch. The filtering media shall be a corrosion-resistant No. 100-mesh or finer wire cloth. The filter shall have a nominal flow rating of not less than 2 times the maximum single pump capacity when filtering oil with a viscosity of ISO VG68 (340 SSU) at 38EC. Three spare filtering elements shall be provided. The top of the filter housing shall be equipped with an air vent valve.

(6) Pressure Oil filter. - The pressure filters have the following salient characteristics:

% The pressure oil filter shall be the high pressure type with ~~removable~~ **disposable, steel**
% **reinforced, micro-fiberglass** filter-element type capable of withstanding a working
% pressure equal to the pump pressure. ~~The with a filter element~~ **shall be** capable of
% removing particles as small as 10 microns **absolute with a minimum efficiency of 98.5**
% **percent and maintain an ISO cleanliness level of 16/13.** ~~in size.~~ The filter shall have
a visual indicator to show when servicing is required and shall contain a pressure-
actuated bypass valve connected in parallel with the full-flow filter, to limit the pressure
drop across the filter to 25 pounds per square inch maximum, either during cold startup,
or as a result of contamination buildup. The filter shall be rated for passing not less than
the maximum combined pump capacity while filtering lubricating oil with a viscosity of
ISO VG68 (340 SSU at 38EC). Six spare filter elements shall be furnished.

(7) Relief valve. - The relief valve shall have the following salient characteristics:

The relief valve shall be a pilot type with an internal drain. It shall have a rated capacity of not less than the maximum combined pump capacity and working pressure rating. Valves shall be 316 stainless steel. The valve setting shall be adjustable through a pressure range with the lower limit not higher than 500 pounds per square inch and the upper limit not lower than 3,500 pounds per square inch.

(8) Flow control valves. - The flow control valves shall have the following salient characteristics:

% The flow control valves shall be needle **metering**, flow dividing type **with graduated**
% **knob and color coded spindle** capable of being **accurately** adjusted to pass the
gallons per minute required. Valves shall be 316 stainless steel.

(9) Pressure gauge. - The pressure gauge shall have the following salient characteristics:

% Pressure gauges shall conform to ASME B40.1. The oil **and water** pressure gauges
% shall be a type suitable for oil which uses a the Bourdon tube **type with to operate a**
% rustproof and corrosion-resistant movement. The **water pressure gauge shall have**
% **range of 0 to 100 lb/in². The low pressure side gauges shall have a pressure range**
% **of 0 to 160 lb/in². The high pressure side** gauges shall have a range of twice the
hydraulic system working pressure. All pressure gauges shall have an accuracy of
one-half of 1 percent over the entire scale of the dial; be the safety type; and be

provided with an approved gauge snubber and a shut-off isolation valve. The dial shall have a diameter of approximately 4 inches.

(10) Check valve - Check valves shall have the following salient characteristics:

Check valves shall be the in-line type. The check valve shall have a minimum rated capacity equal to the pump capacity and a working pressure not less than that required by the system design. Valves shall be 316 stainless steel.

(11) Pressure switch. - The pressure switch shall having the following salient characteristics:

The oil-pressure switch shall be a type, suitable for lubricating oil, which uses a direct-acting sealed piston or a Bourdon tube to operate a mercury or snap-action switch having a rating of at least 10 amperes at 120 volts AC. The switch shall have independent outside adjustments with locking devices for setting the cut-in and cut-out pressures and the pressure settings shall show on a calibrated dial. The switch shall be suitable for a momentary surge of 5,000 pounds per square inch and shall have a minimum adjustable operating range of 1,500 to 3,500 pounds per square inch. The switch shall be a single-pole, single-throw type.

(12) Flow meters. - The flow meters shall have the following salient characteristics:

% The flow meter shall be stainless steel body, **variable area type** suitable for high
% pressure applications and **calibrated** for use with the intended lubricating oil. The
% meter shall display flow in gal/min. **Meter range, accuracy, and repeatability shall be**
% **commensurate with the flow rates to be measured . Each flow meter shall be**
% **provided with an adjustable switch to signal a low flow condition.**

% ~~(13) Terminal blocks. - The terminal blocks shall have the following salient~~
% ~~characteristics:-~~

% ~~The terminal block shall be rated at least for the specific duty of the connected circuits;~~
% ~~however, the rating shall not be less than 600 volts and 25 amperes. The terminal block~~
% ~~shall be molded plastic with bases and barriers molded integrally. The terminal block~~
% ~~shall be of such a design that the tip of the screw does not clamp directly onto the wire~~
% ~~or cable conductor. The terminal block arrangement and location shall be such that the~~
% ~~wire and cable can be supported and the circuits can be connected easily. Six spare~~
% ~~terminals shall be provided for future use.~~

% ~~Where outgoing and incoming circuits enter or leave the enclosure, terminal blocks shall~~
% ~~provide a terminal for each electrically separate circuit conductor and a terminal for~~
% ~~every two electrically identical circuit conductors. The terminal arrangement shall group~~
% ~~the conductors in each cable. Arrangement and location of the terminal blocks shall be~~
% ~~such that incoming and outgoing cables can be supported. Grommets shall be provided~~
% ~~at all holes furnished for wiring cables. Adjacent rows of terminal blocks shall be~~
% ~~separated by at least 6 inches edge to edge. Not less than four spare terminals shall be~~
% ~~provided.~~

% ~~Where wires are terminated at terminal blocks, circuit designations, as shown on the~~
% ~~schematic and wiring diagrams, shall be machine lettered, stamped, engraved, or neatly~~
% ~~marked with permanent ink on one side of the terminal block marking strips. Each item~~
% ~~of electrical control equipment shall be identified with permanent markings, on or~~
% ~~adjacent to it, showing the device name or device designation.~~

% ~~All conduit and wiring required for connecting the motors, pressure switches and float~~
% ~~switches to the terminal blocks in the electrical enclosure on the hydraulic power unit~~
% ~~shall be furnished and installed with the power unit.~~

% ~~Three-phase power conductors shall be carried to each motor through individual liquid-~~
% ~~tight, oil-resistant, flexible metal conduit. The connections to the pressure switch and~~
% ~~four-way valve solenoids shall be carried through separate liquid-tight, oil-resistant,~~
% ~~flexible metal conduits. All conduit connections shall be made using oil-tight connectors~~
% ~~provided with oil-resistant gaskets. Connections to the pressure switch and four-way~~
% ~~valve solenoids shall be made with insulated wire of type XHHIW, or THWN, not less~~
% ~~than No. 10 AWG. Connections to the motors shall be made with insulated wire, No. 6~~
% ~~AWG, meeting the above conduit and insulation requirements.~~

% (13) Lubricating Oil. - The lubricating oil shall have the following salient characteristics:

The lubricating oil shall be ISO VG68 (340 SSU at 38EC). The lubricating oil furnished for filling and testing the system shall be new. Brand name shall be as recommended by the Contracting Officer's Representative to match the oil currently used at the jobsite.

% (14) Hydraulic tubing, piping, and fittings. - **The Contractor shall furnish and install**
% **all tubing and piping required to connect the hydraulic power unit to the turbine**
% **and generator bearing taps.** The tubing shall have the following salient characteristics:

% **(a) All tubing within the hydraulic power unit shall be shop fabricated. All hydraulic**
% **pipe and tubing between the hydraulic power unit up to the first union or flange**
% **beyond the roof cover shall be stainless steel. Unions and flanges shall be the**
% **insulating type. All piping and tubing between the unions and flanges and the**
% **respective connections to existing piping and the hydrostatic pressure taps on**
% **the bearings shall be carbon steel.**

% **(b) All hydraulic fluid line tubing shall conform to the JIC (Joint Industry Council)**
% **specifications. The fluid lines shall be seamless type 316 stainless steel hydraulic**
% **fluid line tubing with flare- or flareless-type fittings, matching the existing installation.**
% **Hydraulic piping shall be ASTM A53 grade B. Pipe fittings shall be forged steel**
% **socket weld fittings.**

% **(c) The high pressure fluid lines shall be of sufficient size that the fluid velocity in**
% **the pressure lines shall not exceed 10 feet per second and 5 feet per second in**
% **the suction lines. The low pressure shall be no smaller than the pipe sizes**

% **shown on drawing A-3389 Rev A sheets 1, 2, and 3.** The pressure lines and wall thickness shall be selected to withstand the design internal working pressure and provide a minimum safety factor of six based on the manufacturer's rating for burst strength.

% **(d) The material on each side of the dielectric union shall match the pipe or**
% **tubing material to prevent dielectric coupling. Alternatively, a stainless steel**
% **bulkhead connector shall be used between the carbon steel dielectric union**
% **and the stainless tubing.**

% **(15) Water piping and fitting. - Materials for the piping system shall conform to the**
% **following requirements:**

% **(a) Stainless steel pipe and fittings. - Stainless steel pipe shall be straight-seam**
% **welded, schedule 10S, type 316L in accordance with ANSI/ASTM A 312 and**
% **ANSI B36.19. Stainless steel fittings shall be schedule 10S, butt welded, type**
% **316L in accordance with ASTM A 403, Class WP.**

% **(b) Stainless steel flanges. - Forged stainless steel, Grade 316L, ANSI Class**
% **150, dimensional conformance to ANSI B16.5.**

% **(c) Gaskets for flanged pipe joints. - Garlock style 3000 compressed non-**
% **asbestos gaskets, 1/16-inch thick as manufactured by Coltec Industries, Inc.,**
% **1666 Division Street, Palmyra, NY 14522 or equal.**

% **(d) Bolting for flanged pipe joints. - Stainless steel bolts, nuts and washers**
% **shall be provided for connecting all flanged pipe joints and for connecting the**
% **piping to any tapped flanges of wall pipes. Bolting material shall be in**
% **accordance with ASTM A 320.**

% **(e) Insulating unions.--Insulating unions shall be constructed so that electrical**
% **contact between the two pieces of pipe being joined by the union will be**
% **prevented.**

% **(f) Insulating sets for flanges. - Insulating sets for flanges shall prevent**
% **electrical contact between the flanges by means of suitable insulating bolt**
% **sleeves, washers, and gaskets.**

% **(g) Miscellaneous materials. - Miscellaneous materials not specified above or**
% **on the material schedule shall be standard commercial quality.**

% **(16) Temperature gage. - The temperature gage shall have the following salient**
% **characteristics:**

% **The temperature gage shall be vapor actuated dial type. The gage shall be**
% **furnished with stainless steel panel flush mount case with back outlet, glass**

% window, adjustable stainless steel pointers with black finish against a white dial
% with permanently embossed black markings, and bronze movement and bearings.
% Scale shall be 0 to 85 degrees C.

% (17) Temperature switch. - The temperature gage shall have the following salient
% characteristics:

% The temperature gage shall be vapor-pressure actuated dial type and shall be
% provided with a calibrated dial, two externally adjusted SPDT switches for setting
% the operating points. The bulbs shall be provided with union type connections
% and the capillary tubing shall be armored full length. Capillary fill shall be non-
% toxic oil. Accuracy and repeatability shall be plus or minus 1 percent of
% adjustable range. The switches shall be suitable for mounting where shown on
% the drawing.

% (18) Float switch. - The float switches shall have the following salient
% characteristics:

% The float switch shall be complete with corrosion-resistant copper or stainless
% steel float, corrosion-resistant stainless steel or cadmium-plated brass rod, two-
% stage with adjustable operating point settings and adjustable differential.

% (19) Heater. - The heater shall have the following salient characteristics:

% The heater shall be the oil immersion type with built-in thermostat and NPT screw
% plug connection. Thermostat shall have a range of 50 to 250 degrees F. The
% heater shall be suitable for light weight oil applications. The thermostat shall have
% a minimum heating capacity of 7.5 kW and shall be rated for 480 volt, 3-phase, 60
% Hertz service.

% (20) Cooler. - The cooler shall have the following salient characteristics:

% The cooler shall be the multi-pass shell and tube heat exchanger with NPT pipe
% thread connections. Water supply requirements for the low pressure side is
% approximately 10 gal/min at a maximum temperature of 95 degrees F. Oil flow
% through the low pressure side is 10.8 gal/min. Oil supply temperature shall be
% maintained between 100 and 120 degrees F. The maximum oil return temperature
% shall not exceed 150 degrees F. All components for the cooler including support
% feet and fasteners shall be 316 stainless steel or better as dictated by the water
% quality data shown on drawing 1117-D-1948.

% (21) Ball valves. - The ball valves shall have the following salient characteristics:

% Ball valves shall be designed for the intended oil or water application. All metal
% parts for the ball valves shall be 316 stainless steel. Body and stem seats and
% seals shall be Delrin or PTFE. Oil system ball valves shall be full port, low

% **pressure or high pressure type as required. Provide SAE fittings for oil valves and**
% **NPT fittings for cooling water valves.**

% **(23) Miscellaneous materials. - Miscellaneous materials not specified above or on**
% **the material schedule shall be standard commercial quality.**

d. Manufacture. -

(1) General. - The Contractor shall place and secure all equipment and appurtenances in the hydraulic power unit. The location of mounting brackets, tapped holes, and the general layout of the equipment shall suit the particular commercial products furnished. All necessary bolts, screws, or other fasteners shall be supplied by the Contractor. The assembled hydraulic power unit shall have a neat appearance with all exterior corners, welds, and other surface irregularities ground smooth.

(2) Tubing and piping. - After each subassembly of the hydraulic power unit tubing has been fabricated, but before final assembly in the unit, thoroughly clean the inside surfaces of loose particles by drawing a lint-free cloth, saturated with solvent, through the tubing. Drain the excess solvent and dry with a blast of clean, dry, compressed air. Care shall be taken to keep any foreign matter from entering the system during or after fabrication. Special care shall be taken in making the connections to remove all burrs and to insure pressure tight joints. ~~The Contractor shall use NPTF (Dryseal American Standard) taper pipe threads where threaded joints are used. Thread compound shall be used sparingly and shall be suitable for use with hydraulic oil. No thread compound shall be placed on the third of the threaded portion nearest the end of the tubing. No tape will be permitted.~~

(3) Identification nameplates. - Laminated plastic identification nameplates with the identification number shown on the hydraulic schematic diagram, shall be furnished on or near the valves. All nameplates shall be made in accordance with drawing 8 (40-D-6234) and shall have a letter height of one-fourth inch, except where otherwise noted. The nameplate shall be black with a white core and shall be one-eighth inch thick.

e. Shop tests. - Unless otherwise directed, all tests shall be witnessed by the Government inspector. The Contractor shall make all necessary adjustments or repairs until the control system functions properly and is approved by the Contracting Officer.

After the ~~high pressure side of the~~ hydraulic power unit has been assembled and necessary adjustments made, the unit shall be shop tested to determine that the unit does not leak and will deliver oil at each of the outlet ports in the quantity and at the pressure specified. The test shall be performed using the hydraulic oil specified. Prior to testing, the oil shall be circulated through the power unit, flushing the system for a period not less than 30 minutes. All filter elements shall be inspected prior to testing and cleaned or replaced as necessary. The equipment and method used for measuring the discharge shall be approved by the Contracting Officer's Representative. Discharge from the power unit shall be measured for a period not less than 10 minutes. After the power

unit has been tested, all adjustable components shall be adjusted to the settings shown on the hydraulic schematic diagram.

Shop test reports. - Within 2 weeks after completion of the shop tests, the contractor shall submit a report containing verification that the unit does not leak, the unit will deliver oil at each of the outlet ports in the quantity and at the pressure specified. The Contractor shall furnish a total of five certified copies of all test reports, data, etc.

% f. Shipping. - After shop fabrication and testing, the hydraulic power unit, complete with support frame, oil reservoir, and hydraulic equipment shall be crated and shipped assembled in the upright position with all piping connections sealed against entry of dirt or water. The oil reservoir shall be drained, and any movable parts shall be secured to prevent loss or damage by vibration or rough handling. Piping and tubing supplied for field installations shall be cleaned, capped or plugged, and bundled for shipment. All valves, fittings, bolts, and other miscellaneous parts for field assembly shall be boxed for shipment.

g. Storing. - While awaiting installation, the Contractor shall store the hydraulic power units and all associated parts on timber blocking and provide adequate cover to protect the equipment from weather and damage. The cost to repair any damage caused by improper storage shall be at the Contractor's expense. Repairs shall be performed by the Contractor and shall be subject to the approval of the Contracting Officer.

% h. Field assembly and installation. - The Contractor shall install the support frames and hydraulic power units where shown on the drawings. Installation shall be in accordance with the equipment manufacturer's recommendations, recognized industry codes and standards, and the following provisions:

% (1) Field assembly of the hydraulic power units shall include: ~~Installing the Government-~~
% ~~furnished equipment for the low pressure side of bearing lubricating system;~~ **furnishing**
% **and installing stainless steel drop-in anchors and all-thread rods with double nuts**
% **and leveling the units; grouting between the base plates and the concrete floor;**
% **furnishing, installing and** connecting the **high pressure** piping from the turbine and
% generator **bearing taps** to the power unit; **furnishing, installing and connecting the**
% **low pressure piping between the existing pipe flanges and the hydraulic power**
% **units;** installing piping supports; all other mechanical connections required to make a
fully operational hydraulic power unit and lubricating system.

% (2) Power and controls - Connection of power and control equipment between the
% power units and the remote control cabinets shall be ~~coordinated with the~~
% **Contracting Officer's Representative. completed by the Government and**
% **witnessed by the Contractor.**

% (3) Piping. -

% (a) Oil piping. - The random length piping shall be cut, threaded, or prepared for
% welding, reamed, fitted, thoroughly cleaned, and installed by the Contractor so

that all joints are oil-tight and the installation is neat in appearance. A thread compound which is satisfactory to the Contracting Officer's Representative shall be used on all threaded joints in the control systems. No thread compound shall be placed on the third of the thread length nearest the end of the tubing and no tape will be permitted. Special care shall be used to keep the hydraulic system absolutely clean and free from all dirt or moisture, both before and after installation. After each piping subassembly has been fabricated but before installation in the system, it shall be completely deburred and thoroughly cleaned. The inside surfaces near any welded joints shall be cleaned, using a power-driven flue or tube wire brush. In addition, all piping shall be cleaned by drawing a lint-free cloth impregnated with a suitable solvent through the tubing. The interior of the piping shall then be dried with a blast of clean compressed air which has been filtered through a dirt and moisture trap.

(b) Water piping. - The Contractor shall fabricate and install all piping in a workmanlike manner in accordance with the construction drawings and the applicable requirements of Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code and the ASME Code for Pressure Piping B31.1. The interior of all pipe, fittings, and valves shall be clean and free from blisters, loose mill scale, sand, dirt, and other foreign matter when installed. The removal of foreign matter from the piping systems by compressed air, a drawn cloth or by other means approved by the Contracting Officer's representative shall be the responsibility of the Contractor. Care shall be taken to prevent the entrance of foreign matter into the piping during the progress of the work. Where necessary, open ends of pipe, fittings, and valves shall be plugged or closed in a suitable manner to prevent clogging during construction. If any portion of the piping should become either partially or wholly clogged before final acceptance of the work, it shall be thoroughly cleaned or shall be replaced.

Insulating type joints shall be provided at connections between stainless steel water piping and piping components of other materials. Insulating type joints for flanged connections shall be made with insulating sets. Insulating type joints for threaded connections shall be made with insulating unions.

Stainless steel pipe in contact with ferrous pipe supports shall be isolated with an adhering insulating dielectric wrap or plastic coating on hangers or supports in order to prevent local galvanic corrosion. The Contractor shall submit for approval data for the insulating dielectric wrap to be used. Electrical tape will not be allowed.

When assembling stainless steel flanges to flat faced flanges of other materials, the raised face of stainless steel flanges shall be removed.

Any rust preventive compound that was applied to the faces of flanges before shipment shall be removed before the flanges are installed. Acid or tools that would mar the finish surfaces of the flanges will not be permitted.

Flange surface finishes shall be in accordance with MSS Standard Practice SP-6 and ANSI Standard B46.1. Flanged joints shall be made up with undamaged gaskets properly centered in the joints. The threads of bolts, studs, and nuts shall be lubricated so that the nuts can be run up by hand. Care shall be taken that excessive stress is not applied to bolts or studs and that the tightening of bolts and subsequent torque is applied in a uniform manner in accordance with the requirements and recommendations of the ASME Boiler and Pressure Vessel Code and the ASME Code for Pressure Piping B31.1. When fabricating and installing lapped joint type flange connections, extra care shall be taken to ensure that these flanges draw up tightly without subsequent leakage.

All pipe after being cut and before being threaded shall be reamed, and all burrs shall be removed. Threads shall be cut to the proper pitch, size, and thread form with suitable dies and shall be free from torn or ragged surfaces. Threads shall conform to the American National Standard for Taper Pipe Threads (ANSI B1.20.1). No more than three threads on the pipe at any joint shall remain exposed after installation. Screwed joints shall be made up with joint compound applied to the male threads only. Screwed joints shall be metal to metal, and caulking of screwed joints to stop or prevent leakage will not be permitted.

All details concerning the welding of pipe joints including welding procedures, welders' credentials, and welding operators shall conform to the applicable requirements of the latest edition of Section IX of the ASME Boiler and Pressure Vessel Code and the ASME Code for Pressure Piping B31.1.

(4) Servicing the hydraulic power units with lubricating oil.

(5) Flushing. - After the hydraulic power units have been assembled and necessary adjustments made, oil shall be circulated through the power unit, flushing the system for a period not less than 30 minutes. Flushing oil shall be the same oil currently used at the job site at the time the equipment is ready for testing. All filter elements shall be inspected prior to testing and cleaned or replaced as necessary.

(6) Field Testing. - Unless otherwise directed, all tests shall be witnessed by the Government inspector or the Contracting Officer's Representative. ~~After the hydraulic power units are completely installed and filled with oil, they shall be flushed by circulating oil through the fluid lines for a period not less than 30 minutes. All filter elements shall be inspected prior to testing and cleaned or replaced as necessary.~~ The system shall then be tested at the maximum relief valve setting in all modes of operation to check for leaks, confirm required pressure settings, determine needle valve adjustments, and ensure proper operation of all hydraulic and electrical components. Any sources of oil leaks shall be repaired and the system retested. Any faulty hydraulic or electrical components shall be repaired or replaced and the system retested. The pressure relief valves, flow control valves, oil level switches and oil pressure switches shall be adjusted to the required settings. After the hydraulic

power units are operational and all adjustments are finalized, each turbine/generator shall be operated through a complete startup and shutdown cycle to verify proper system integration and operation. Components shall be adjusted until all parts operate properly. After all testing and adjusting is completed to the satisfaction of the Contracting Officer's Representative, the Contractor shall certify in writing and on company letterhead that the equipment is fully serviced, checked, tested, adjusted and ready for operation. The certification shall be delivered to the Contracting Officer's Representative.

Field test report and certification. - Within 2 weeks after completion of the field tests, the contractor shall submit a report containing the test procedures, processes followed, results of each valve setting and mode, list pressure settings, list any adjustments made, list settings of all valves and switches and certification in writing and on company letterhead that the equipment is fully serviced, checked, tested, adjusted and ready for operation. The Contractor shall furnish a total of five certified copies of all test reports, data, etc.

Submittals - Submittals shall be in accordance with this subparagraph, paragraph 1.03 (Submittal Requirements) and 1.04 (Drawings and Data to be Furnished by the Contractor).

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i. Cost. - The cost for design, assembly, shop test, furnishing, **cleaning and repairing the government furnished low pressure pumping units**, field assembly, installation, servicing and field testing the hydraulic power units and corresponding components as well as furnishing spare parts, shall be included in the applicable lump-sum prices bid therefore in the schedule which prices shall include the cost of all labor and materials necessary to perform the work required by this paragraph.

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**PART IV
CONTRACT DOCUMENTS, EXHIBITS, AND ATTACHMENTS**

1. List of Attachments

(a) Drawings, General

The drawings for the existing installation are included in these specifications to show the current configuration of control equipment and conduit routing. These drawings are to be used for bidding purposes only, since the details may vary from actual conditions.

Some of the drawings included herein show equipment that is not a part of the work required under these specifications. Equipment shown on these drawings which is not applicable under these specifications shall be disregarded. Reference drawings referred to on specifications drawings, and not included herein, are not considered necessary for bidding purposes but shall be furnished to the Contractor, where necessary, for installation purposes. Where details shown on standard drawings 40-D-, and 104-D- series differ from those shown on the other drawings or the requirements of these specifications, the details shown on other drawings or the requirements of the specifications shall govern. In the event there are minor differences as determined by the Contracting Officer's Representative between details and dimensions shown on the drawings and those of existing features at the site, the details and dimensions of existing features at the site shall govern.

(b) Additional copies of drawings. - The Contractor will be furnished such additional copies of the specifications and drawings as may be required for carrying out the work. Full-size contact prints of the original drawings from which the attached reproductions were made, other than standard drawings 40-D-, and 104-D- series, will be furnished to the Contractor for construction purposes upon request. Additional prints of the standard drawings 40-D-, and 104-D- series will be furnished upon request. The number of prints of each drawing furnished to the Contractor will be limited to 10 contact prints and one reproducible.

(c) List of Drawings

The following drawings are made a part of these specifications:

**HEADGATE ROCK POWERPLANT
MECHANICAL**

New Drawings:

1. 1117-D-1946 - Hydraulic Power Unit - Bearing Lubricating System - General Arrangement - Plan-View-Materials List
2. 1117-D-1947 - Hydraulic Power Unit - Bearing Lubricating System - Guide Bearing Engineering Data
3. **1117-D-1948 - Hydraulic Power Unit - Bearing Lubricating System - General Arrangement**

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Existing Installation Drawings:

3. 1117-D-216 - Piping Details - Material Schedule
4. 1117-D-235 - Piping Layout - Exposed Piping Part Plan - Floor EL. 327.50
5. 1117-D-236 - Piping Layout - Exposed Piping Part Plan - Floor EL. 327.50
6. 1117-D-240 - Piping Layout - Exposed Piping - Section F-F

Standard Drawings:

7. 40-D-6032 - Induction Motors - Design and Nameplate Data to be Furnished by Contractor
8. 40-D-6234 - Standard Nameplates

Manufacturers Drawings:

Airline Hydraulics Corporation:

9. A-3389 Rev A Sheet 1 - Hydraulic Schematic (Voith Hydro)
10. A-3389 Rev A Sheet 2 - Wiring Diagram & Electrical Schematic (Voith Hydro)
11. A-3389 Rev A Sheet 3 - Gen. Arrg't - Pumping Unit (Voith Hydro)

Voith Hydro Inc.:

12. 6563-AX-1 Rev 07 - General Arrangement
13. 6099-MU-2 Rev 04 - Bearing Lube Schematic
14. 4840-ACX-1 Rev 01 - Piping Plan
15. 4840-ACY-1 Rev 02 - Piping Elevation
16. 4840-ACZ-1 Rev 01 - Piping Details
17. 126-56042-0002 F - Center Flange Bearing, Split
18. 063-000-160 (Sheet 1 of 1) - 18.11" DIA x 18.11" LG. Pressure Lube Guide Bearing
19. 000-303-174 (Sheet 1 of 1) - 18.11" DIA x 18.11" LG. Journal Bearing
20. 061-000-085 (Sheet 1 of 1) - 34.00" - (8)x(8) PAD Thrust Brg & 14.96" x 14.96" LG Journal Bearing - Pedestal Mounted
21. 000-303-186 (Sheet 1 of 1) 14.96" x 14.96" LG Journal Bearing

**Response to Questions from Site Visit
Bearing Lubrication System
RFQ No. 99-SQ-30-0016**

1. What is the bearing oil flow rate for hydrostatic lift of the turbine bearing?

See Specification Paragraph 3.01b.(2).

2. Need further clarification on bearing oil cleanliness. Specs mention 10 micron and 20 micron. Is this nominal or absolute? Should we use an ISO specification to eliminate interpretation?

See Specification Paragraph 3.02c.(6).

3. Do we really want NPT pipe threads on stainless steel, since they always leak?

Yes, as required by the specification.

4. Need clarification that the contractor is responsible to furnish and install the high pressure piping from the pumping units to each of the bearings.

See Specification Paragraph 3.02c.(14)(a).

5. What is the cooling water flow rate and maximum supply temperature?

See Specification Paragraph 3.01e. The flowrate for the previous cooler was 10 gpm at 10 psi pressure drop through the system. Bearing losses are shown on the design data sheets. The new flowrate is dependent upon any additional changes to the system and the heat exchanger selected.

6. Where does the Government connect to the skids electrically?

The Government will design and install all the electrical, including conductors and conduit, from the individual components (i.e. motor, switch, valve, etc.) to Government furnished controllers located out of the turbine pit.

7. What components from the existing bearing lubrication system will the Government furnish?

See Specification Paragraph 1.01a. And 1.02a.(5).

8. Need to give direction on how skid is to mounted.

See Specification Paragraph 3.02h(1).

9. Is the piping between the hydraulic power unit and the turbine and generator bearings to be painted?

No.

10. Government furnished pump ratings:

Bearing lubrication: pumps: 10.9 gpm at 125 psi
Oil transfer pump: 33 gpm at 80 psi